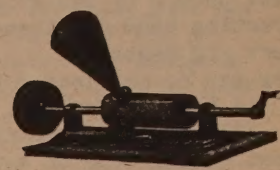


THE NEWSPAPER FOR  
THE HOBBYIST OF VINTAGE  
ELECTRONICS AND SOUND

# THE HORN SPEAKER

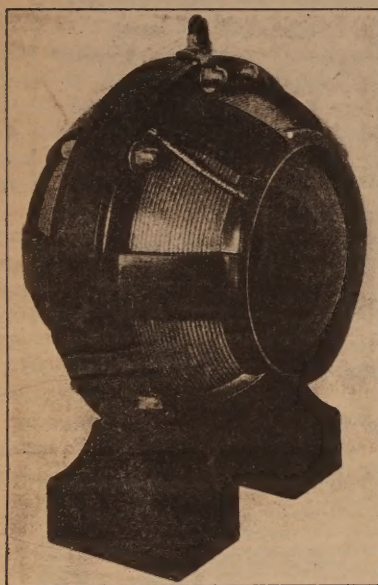


PHONOGRAPH CENTENNIAL  
1877 - 1977

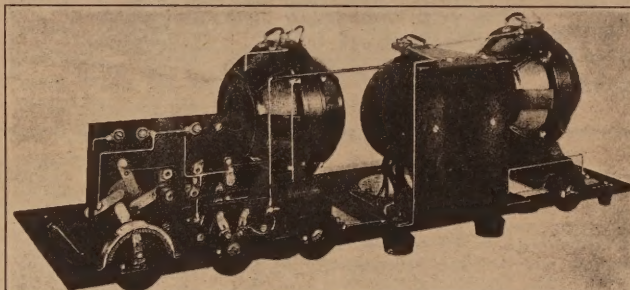
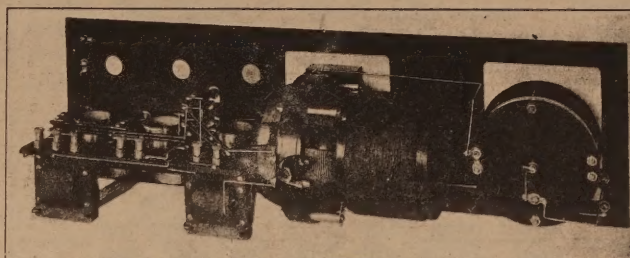
Radio News for November, 1921

## High Class Workmanship in Amateur Radio Apparatus

By ARTHUR H. LYNCH



On the right the photographs showing the interior of amateur receiving sets give an idea of the degree of perfection attained in the manufacture of such apparatus by American firms. Compare the workmanship and compactness of these instruments with those of earlier days. On the left is a close-up of a variable meter mounted on a moulded composition frame.

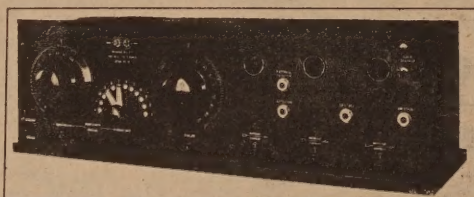


THERE was a day, not so very long ago, when America had to bend her knee in homage to the efficiency of the foreign worker. Germany, France and England were unquestionably our peers, in the manufacture of all kinds of instruments which were mechanically and scientifically correct.

Today there is a different story to tell. The accompanying illustrations bear witness to the fact that, in workmanship, design and ease of operation and control, not to mention the appearance, it is now time for foreign manufacturers of radio apparatus to take off their hats to America.

The story of bakelite is a very interesting one, for it has changed the whole color of the insulating industry. Most of us remember when it was introduced and vied with vulcanite for supremacy as material for front panel and turned dials and knobs. Today, it is found moulded in all forms, made to suit the specific requirements of the unit in which

it is used. It is now cheaper, can be turned out more rapidly and the finished product is more pleasing to the eye and more accurate in its dimensions than could previously be made by the hand of the most skilled worker.



This Small Compact Amateur Set Embodies a Tuner and a Two-Stage Amplifier Fitted With the Very Latest Improvements; it Tunes up to 3,000 Meters.

Typical of the external appearance of this grade of amateur radio apparatus is the cabinet set which is here shown. It will be noticed that it is complete in every detail.

The wave-length range is from 150 to 3,000 meters, and it is controlled by three knobs. Telephone jacks permit the use of an external detector, if it is desired, the detector tube of the set itself, or one or two stages of amplification. Posts are provided for the connection of a "Loud Speaker," while all the connections for the batteries for the tubes are made to binding posts, through apertures in the rear of the cabinet.

The view of the interior reveals the character of workmanship, which is now putting American amateur radio apparatus in a class by itself. An interior of another receiver is also shown, in order to give a more detailed explanation of some of the new and very improved features incorporated in modern apparatus. Particularly striking is the new form of variometer, which is of moulded bakelite and is made in such a way as to obviate the necessity of having the bakelite come between the turns of the stator and

(Continued on page 410)

rotor windings. On the panel, it will be seen that aluminum screens have been provided to cut out the effect of "body capacity" while adjustments are being made.

Vernier attachments have been provided, where any critical adjustment is necessary and the construction of the verniers is interesting in itself. The control knob and the little rubber tire, which is air-inflated, are mounted on the same axle and the rubber tire bears against the inner side of the dial. The only portion of the vernier which is visible from the outside of the cabinet is a small portion of the control knob.

The rheostats which are of the same design are marked in ohms.

### DAILY NEWS AND CONCERTS BY RADIO TELEPHONE.

The Westinghouse Co. has opened a radio telephone broadcasting station at its plant in Newark, N. J., and, with the co-operation of the *Newark Sunday Call*, is supplying news and concerts which can be heard by wireless operators within a radius of 200 miles.

Every night, beginning at 8:05 Eastern Standard Time, an entertainment consisting of a digest of the day's news, Government reports and a musical entertainment are given. A special feature of the entertainments is a children's hour every Friday night at 7 o'clock, when songs and stories for the youngsters will be radiophoned.

During the World Series baseball games, every ball, strike and other play was reported, as soon as made, from this station, so that thousands were able to enjoy the games. Similar service will be provided for the major football games and other important events.

The Westinghouse Newark station operates on a wave-length of 360 meters and its call letters are WJZ. It should be easily heard as far south as Baltimore and as far north as Albany, while under favorable conditions, the messages should be audible in practically the entire area east of the Mississippi River, and as far east as the Bermuda Islands.

### TIMES OPERATOR GETS PRIZE FOR WINNING CODE CONTEST.

Hundreds of amateur radio telephone and wireless telegraph operators within a radius of 200 miles of New York a short time ago heard officials of the National Amateur Wireless Association present a silver cup to B. G. Seutter, wireless operator of the New York Times Transatlantic radio receiving station. Mr. Seutter received the cup for winning the American open championship. He received code at forty-four and one-third words a minute with no mistakes.

The presentation was held in connection with the New York Electrical Show in the Seventy-first armory. The wireless telephone was used to spread the addresses and reception speeches to members of the Association. Major Andrew White, President of the National Amateur Wireless Association, in formally awarding the cup, pronounced Mr. Seutter's work "a remarkable achievement of one hundred percent perfection."

Arthur Williams, General Manager of the New York Edison Company, which donated the cup, was specially connected with the armory by wireless telephone at his home, where he was confined by illness.

Radio News for November, 1921

### Opera Singer Heard 300 Miles Away

CONCERTS by Radio are now common things, and in all the exhibitions of a more or less technical nature, a Radio-telephone station is used to "tell the world" of the doings at this particular show.

At the Electrical Show, held in the 71st Regiment Armory in New York City recently, such a station was installed and broadcasted daily some information and news.

In the evening, a concert was given by Radio to an audience spread over a wide area, and well-known artists, singers or musicians of the opera company, could be heard quite distinctly, thanks to a perfect modulation.

In this view showing Miss Anna Case singing in front of the microphone, may be seen the radio-telephone station installed at the electrical show in New York City, thanks to which thousands of amateurs could hear the concert in their homes.



Radio News for November, 1921



to begin subscribing to your newsletter again. I collect phonographs and radio phonographs from 1925-35 and need to have many of the magnetic pick-ups rebuilt, and orthophonic Victrola reproducers repaired. Would greatly appreciate any help finding an expert that can repair these properly.

Thank you,  
Ronald Callahan  
6002 Mentana St.  
New Carrollton MD 20784  
Editor...check the classified ads.

Dear Jim:

Enclosed find \$5.50 check for another years subscription.

I think your magazine is pretty good. May I make a suggestion?

Could you have an article every month or so on circuit and construction details of some well known home brew or kit set like Erla Reflex, Browning Drake, etc. I know they are in old magazines, but how many of us can pay \$5.00 or more for an old mag. even if we could locate one we want?

Also info. in Riders on some early radios is pretty meager. Some old radios like Freed-Eisemann NR-5 and some others don't even show types of tubes used, etc. Could you give more factual info on some of these old "classics" and a photo of what they look like?

I may be out of order on this because I think you're already doing some of this sort of thing.

Regards,  
Bill Irvine  
314 Hamilton St.  
Route 6  
Gulfport MS 39501

Editor...you are right. We are doing some of this sort of thing, but not enough.

Dear Jim,

Your air mail reminder of the expiration of my subscription to "The Horn Speaker" came a day or so ago. I will indeed be happy to renew once again, and I would ask you to pencil my subscription in. Regretfully, I will have to ask you to wait a few days for payment until I or my wife can get to our trading bank for the issue of a cheque in U. S. funds in your favour. You see, I am housebound at the moment with my right leg in an elevated position (bandaged toe to groin) due to a blood clot I collected as the result of a minor accident on some stairs 2½ weeks ago. Very annoying and difficult to live with!

I have thoroughly enjoyed receiving the magazine which has helped to revive a lifetime of memories working in radio (+TV & HI FI etc.) a cycle not quite completed yet, I hope.

Shortly you will receive a note from me advising a change of address. My wife & I have just had a new home built in which we hope to have a few happy retirement years.

We should have been there months ago but for delays and difficulties with our builder. Hopefully this phase will soon pass.

Up to the time of my accident we were commencing packing our things for the shift, and one of the big tasks to be undertaken has been the packing in cartons, many years accumulation of various technical books and magazines. Besides the more weighty tomes of Henney, Glasgow, Terman, Rider and others, there has been a considerable number of periodicals. These include Radio News, Radio Craft, Shortwave Craft, Q.S.T., CQ, Wireless World (U.K.) Electronics Australia etc., particularly of the era 1930 - 1950. Some Radio News go back to 1923 and bear continual re-reading. A lot of the material which you place in "The Horn Speaker" will undoubtedly reveal itself to me when we resettle and I unpack the books.

It is my hope that I will be able to catalogue them all before departing this earthly scene! Because I hate to think that such a good source of reference could be lost by those who will look after my estate, I have willed them all to our local Museum of Transport and Technology, (MOTAT) where hopefully they will be kept for latter day folk who might be interested in the earlier days of radio. There are of course New Zealand books which have been published over the years, and I have alongside me 3 or 4 which date back to 1928, 1930, 1931, 1932, at a time when I was still at school and an interest in radio was just awakening within me. (Much to my fathers disgust as he wanted me to be an architect!). In the 1930 issue of the "New Zealand Radio Handbook Annual" is a very interesting story of the "Majestic" receiver, the make on which I cut my teeth. While I was still at school my father bought a Majestic 90, 4RF stages, power detector and push pull audio and mighty powerful and sensitive it was. In those days it was probably the most successful set on the N. Z. market. I can still remember the thrill we all had of hearing Phil Harris at the Coconut Grove in Los Angeles and Bing Crosby singing from KFI Los Angeles. In those days reception of stations from the U.S.A. was like receiving locals today. KFI, KFOX, KMOX, WLW, KDKA to name just a few, were always available. Not quite factual sometimes static did mar things a bit! When WLW was on the very high power of 500KW we would receive it in the daylight from mid-day to close down (N.Z. time). And the "monkey gland transplant (for longer life!) station, XEN, which went across the American border used to come in here like the proverbial load of ashcans. Today we no longer hear many U. S. stations on medium wave and while I have some theories

often wonder the exact cause. My log of U.S. stations received totals close to 600 and added to the Pacific and other areas we received totals up towards 1000 stations. Alas, those days are long gone and with my becoming a "ham" and a qualified technician the emphasis shifted completely. Thinking back on it all I am sure that as young people we had a lot more fun than those of today in respect of the radio world. We made our own variable condensers, rectifiers, coils, resistors, complete sets from crystal sets upwards (on a shoe string too - it was depression time.) - today how much home building of receivers goes on. Not much I'd say. Why, my nephew aged 5 carries around a delightful National Panasonic 8 transistor receiver (which Uncle Arthur has to repair when he breaks it!) Certain it is that he and his generation will not know the joys which we oldies had with early radios.

Well Jim, I don't want you to think that I'm on a sorrowful nostalgia kick, but just hope that the foregoing is of some interest to you. Please keep up the good work. Don't forget to keep my issues aside until my remittance arrives. You will be hearing from me again before too long.

With kind regards,  
Arthur E. Allen  
35 Fairlands Ave.  
Avondale, Auckland 7  
New Zealand

Editor...It is a good feeling to relive the fun of the past.

## Club News

### NIAGARA FRONTIER WIRELESS ASSOCIATION SUMMER MEET

The newly formed Niagara Frontier Wireless Association is planning a summer meet to be held Aug. 13, 1977 at the Old Amherst Colony Museum, 500 Smith Rd., East Amherst, New York 14051. The activities will take place between 11:00 AM and 5 PM.

The club is planning a program that will appeal to both the collector and the historian. There will be a talk and a display on Spark Gap Transmitters by Ken Conrad. Art Albion will have a demonstration on nickel plating to help you restore those nickel plated items in your collection. This will be followed by a panel question & answer session with the newer enthusiast in mind.

The club is also planning an old equipment contest and a flea market. The museum is also arranging a "Tour of Williamsburg" program for the ladies not interested in the wireless program.

Everyone is welcome to attend, there is a \$1 admission to cover the museum's expenses. If you would like further information just drop a note to Niagara Frontier Wireless

Assoc. in care of the museum (above address). We will send you a flyer with the program and a map. This would be a fine opportunity for you to see Niagara Falls and attend an Antique Radio Meet too.

#### IN THE GROOVE

The Michigan Antique Phonograph Society has an official publication called *In The Groove* which is edited by John Whitacre.

It contains news such as a large display of antique phonographs at the Grand Rapids Museum during May and June. John Perschbacher is responsible for the display. The Lansing Public Library on Capitol Avenue has provided exhibit space for the month of June. An address for the Society is: 2609 Devonshire, Lansing, Michigan 48910.

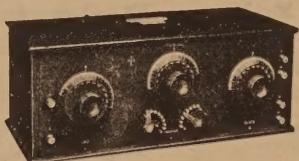
#### BUCKEYE ANTIQUE RADIO & PHONOGRAPH COLLECTORS' CLUB OF OHIO

The next meeting is June 19 at the home of Don Gfell, 530 Needham Ave., Kent, Ohio 44240, 216 673-6487. This is also our annual picnic. Everybody is welcomed for an enjoyable day. The main course is hamburgers and hot dogs. Please bring side dishes to compliment the main course and every body is requested to bring their own place setting. We could also use a few extra grills, chairs and tables. Also bring items for show, sale, and other items of interest. In order to promote the growth of our club, please try to attend the scheduled meetings!!

### "ACE" Apparatus



Type AVB Regenerative Tuner  
150-475 Meters. Price \$32.00



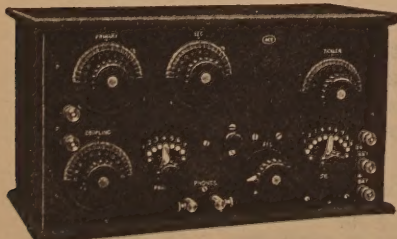
Type AVA Regenerative Tuner  
175-475 Meters. Price \$45.00



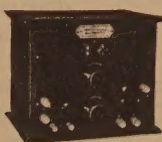
\*Type ATC Detector Cabinet.  
Price \$12.00



Type AVC Short Wave Regenerative receiver, 175-475 Meters, Price, \$56.00



Type TTR Regenerative Receiver—150-3000 Meters. Price \$75.00



A-2 Two-Stage Amplifier  
Price \$40.00

#### COLUMBIA CHAMPION

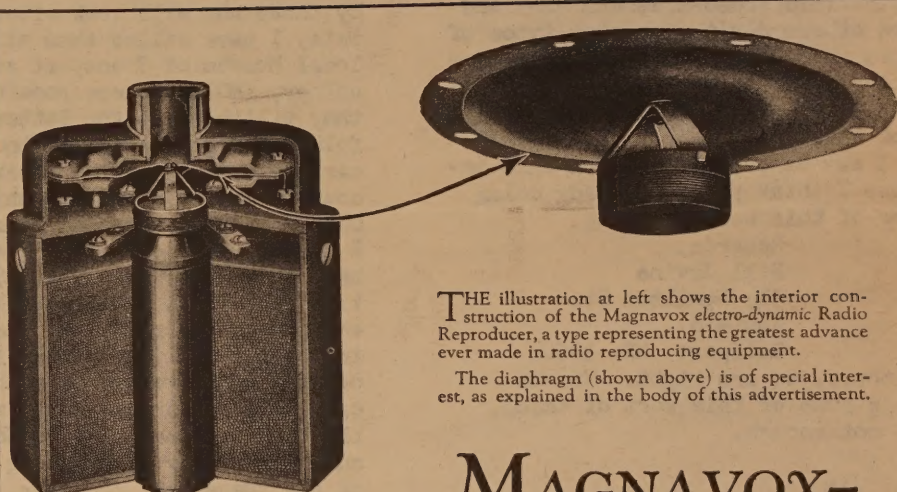


*Disc Graphophones*

Type BH  
\$30.00

1906

1924 ad



THE illustration at left shows the interior construction of the Magnavox electro-dynamic Radio Reproducer, a type representing the greatest advance ever made in radio reproducing equipment.

The diaphragm (shown above) is of special interest, as explained in the body of this advertisement.

## MAGNAVOX— The true Radio Reproducer

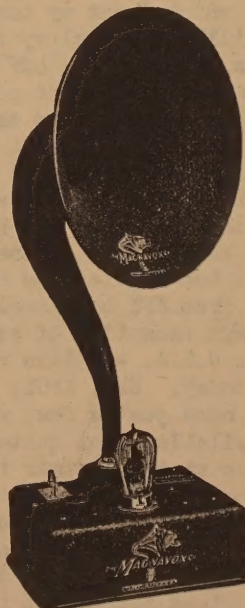
THE basis of the operation of a Magnavox Reproducer is its diaphragm, the importance of which can be seen from the fact that it is required to render an almost human service in recreating every tone and quality of instrumental music as well as speech.

This diaphragm (as illustrated above) has been designed and constructed in accordance with entirely new principles. Its shape, size and special character make it capable of responding to the widest range of tones.

But even this highly efficient diaphragm might be handicapped by operating restrictions—every diaphragm must have a vibrating force applied to it, and the inherent ability of any diaphragm will be injured if it is affected by mechanical operation or other foreign influences.

The use of the electro-dynamic principle of operation (found only in Magnavox Reproducers) removes all objectionable influences. This principle, utilizing the famous "movable coil" permits the Magnavox diaphragm to respond in perfect unison to the original tone.

There is a Magnavox for every receiving set: Type R for storage battery sets, and M1 for dry battery sets.



A1-R—\$59.00

This instrument (Magnavox Combination Set) consists of Magnavox electro-dynamic Reproducer combined with a Magnavox Power Amplifier in one unit.

## THE MAGNAVOX COMPANY Oakland, California

New York Office: 370 SEVENTH AVENUE  
PERKINS ELECTRIC LIMITED, Canadian Distributors  
Toronto, Montreal, Winnipeg



I WANT  
TO GO !



CONVENTION  
DALLAS, TEXAS  
AUG 5, 6, 7  
77

FORUMS

CONTESTS

SWAPFEST AND TRADES

EXHIBITS AND BOOTHS

BANQUET AND SPEAKERS

AND THE BIGGEST SVRPS AUCTION YET!

FOR A PRE-REGISTRATION PACKET AND A  
CHANCE AT THE GRAND PRIZE WRITE:

CONVENTION 77  
P.O. BOX 19406  
DALLAS, TEXAS 75219

ALL PRE-REGISTRATIONS RECEIVED BY AUGUST 1st WILL BE  
ELIGIBLE FOR THE DRAWINGS.



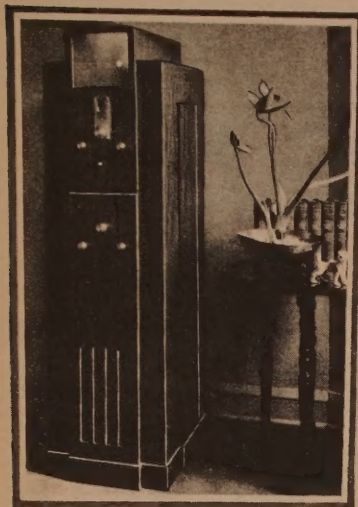
*Southwest*

*Vintage Radio and Phonograph Society*

P.O. Box 19406

Dallas, Texas 75219

## TELEVISION RECEIVER



The Western Television Receiver.

THE Western Television Corp. presents a new television receiver, incorporating two sets—one for the reception of pictures and the other for the accompanying sound transmitted in the broadcast band. A modernistic cabinet, shown above, together with a neat ground-glass screen are attractive features.

## RADIO-CRAFT

for AUGUST, 1932

RADIO NEWS FOR SEPTEMBER, 1932

*Personal interviews  
with broadcast artists  
and executives*

By

Samuel Kaufman

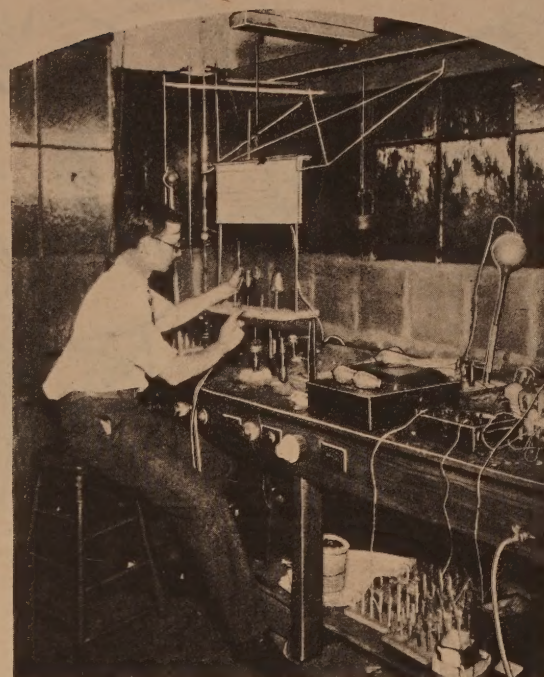
RAY PERKINS, one of radio's most versatile entertainers, recently launched a new NBC series of novelty programs heard Tuesdays and Thursdays under the sponsorship of the Barbasol Company. His programs consist of songs, music and humorous chatter. He is supported by Peter van Steeden's Orchestra. Song-writer, singer, pianist and comedian, Perkins has often been referred to as the "one-man radio show." Half of the songs he sings on the air are his own and many of them have not been published. Since he first started to entertain at the age of six, Perkins has written musical shows, appeared in vaudeville, made pictures in Hollywood and worked for a magazine, in addition to his successful radio ventures. This program brings Perkins under the same sponsorship as Singin' Sam, of the CBS, and the Old Singin' Master of the NBC.



BEN BERNIE

BEN BERNIE—the CBS "Old Maestro"—was born Benjamin Ancel, the son of a blacksmith who lived in the shadow of Brooklyn Bridge. Young Benjamin took to music at an early age and at fifteen, it is said was an instructor at a New York music school. His next step was to the duties of violin demonstrator in a New York department store. Given to wisecracks, even at that early date, Ben always amused on-lookers. A theatrical magnate happened along one day and Ben found himself in vaudeville as one-half of the team of Bernie and Klass. Ben's act was designed along musical lines until he teamed with Phil Baker. The Bernie-Baker vaudeville team went in for comedy, the pay checks increased and the act became an accepted hit.

Although the team split up several years ago, Bernie and Baker remain steadfast friends—each one now a star in his own right. Ben was seized with the idea of a novelty band with the conductor doing something besides waving a baton. The idea clicked from the start and Bernie found himself and his band vaudeville headliners. He was booked at the Roosevelt Hotel in New York for five years. London and Hollywood successes followed before the band began a long Chicago booking. His broadcasts from the Windy City over coast-to-coast Columbia hook-ups have brought him added laurels.



Gaseous rectifiers are developed in the chemical laboratory at the hands of skilled chemists, aided by expert glassblowers. Complete pumping equipment, tanks with different gases, electrical testing instruments and other apparatus aid the designer of such devices in carrying out the work. In almost every branch of radio the unassuming chemical laboratory plays a vital rôle

There are ten thousand different grades of paper available for loud speaker diaphragms, complicating the manufacturer's problems. Here is Burtex, an impregnated cloth cone, which is a triumph of the chemist

IT may seem a far cry from the wonderful reproduction of a radio program in the delightful atmosphere of the modern living-room to the test tubes and beakers and vile smells of the chemical laboratory. Yet the two are closely knitted together as the practical basis of the present radio industry.

At every turn in the design and production of radio equipment there are chemical problems to be solved. In fact, the chemist today plays an ever-increasing rôle in the production of radio sets, accessories and parts, so that the larger radio manufacturing organizations are just as insistent on having the necessary chemical direction in their efforts as they are on having the best electrical and radio talent. From the radio vacuum tubes, based on electronic emission from specially coated filament wires, to impregnating compounds for condensers and sealed-in assemblies, and again to short-wave transmitters with extremely high-frequency conductors to be insulated, the chemist is called upon at every turn to pass judgment on the chemical aspects of the case. And so radio is a chemist's field, just as it is that of the electrical engineer, mechanical engineer, metallurgist and other technicians, quite in addition to being the supposed exclusive field of the radio engineer.

Perhaps the greatest work of the chemist in the field of

# The Chemist's Rôle in RADIO

*Most of us think of radio problems as nuts for the electrical or radio engineers to crack. But chemistry is playing a surprisingly important part behind the scenes in radio development, as this article discloses*

By Austin Lescarbourea

radio is in connection with insulating problems. Here we are dealing not altogether with high potentials, which necessitate considerable electrical strength for the insulators in the case of transmitting practice, but also with radio-frequency losses that come about in radio receivers handling weak radio-frequency energy, and particularly in short-wave transmitters handling powerful radio-frequency energy.

Originally, hard rubber was the favorite material for radio insulation purposes. In recent years, however, the trend has been away from hard rubber, as chemists have found new materials. Bakelite, as well as other synthetic resinous compounds, has played a very important rôle in radio, and there is more bakelite being used in radio today than any other insulating material. Here the chemists have sought to produce various grades and kinds of bakelite, to meet specific requirements ranging all the way from simple mechanical considerations, perhaps involving beautiful moulding, to certain high-frequency insulation problems.

Interesting developments have been made in the field of synthetic ceramics, or ceramics made of pure chemical ingredients, mixed under laboratory supervision. Such new materials as Isolantite and Crolite have played a very important rôle

in radio—in fact, they may be said to be essentially radio materials, since in no other electrical applications are their excellent insulating properties so fully appreciated. Chemists, specializing in these materials, have been able to develop all manner of special materials, differing slightly one from the other, so as to meet specific requirements. Thus in the case of high-frequency circuits, the aim has been to reduce the phase angle difference to a minimum, even exceeding that of hard rubber heretofore considered the standard of excellence. In the case of transmitting tubes, the aim has been to produce a material capable of withstanding severe heat with maximum insulation, together with the severe shock of rapid heating and cooling.

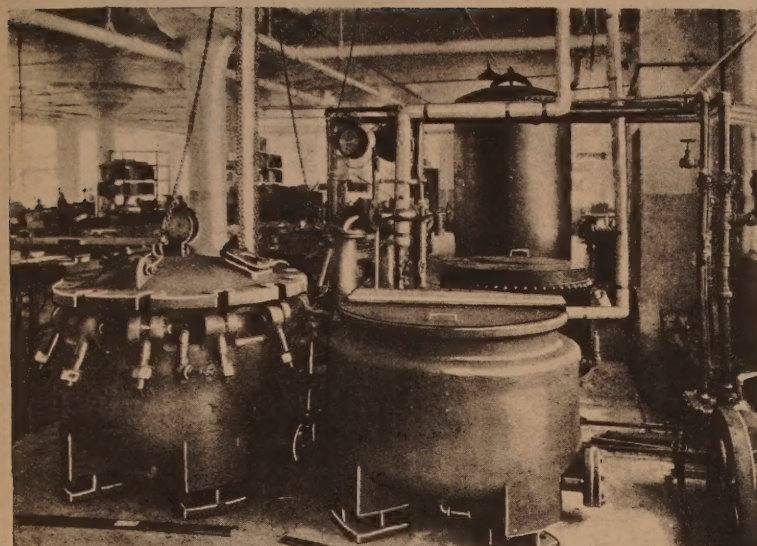
Both Isolantite and Crolite have their origin in a fine powder which is treated with a gas catalyst and pressed into various forms. These may be billets, which are machined to final shape in subsequent operations; extruded rods and tubes, which are cut to length and machined if necessary; and flat slabs or sheets. The roughly formed parts are dried, and then placed



DESPITE America's broadcasting supremacy, the field of radio drama has been badly neglected by domestic stations. The B.B.C., we discovered on our recent London visit, gives far more time and care to this important division of broadcasting than does either of the two American networks. But, of late, we have noticed some increased efforts on the part of NBC and CBS to advance radio drama. The NBC's Radio Guild, under the direction of Vernon Radcliffe, has made some worthy efforts, although many programs have been devoted to adaptations of stage plays rather than the presentation of original radio scripts. The CBS recently

inaugurated a series of half-hour experimental dramas, under the direction of Don Clark, continuity chief. The series, according to Mr. Clark, was designed to prove that mature radio drama can be produced to hold and intrigue an audience for half an hour.

LOWELL THOMAS, noted author, traveler and news broadcaster, has signed a long time contract with his new sponsors, the Sun Oil Company, which presents him daily over the NBC. The author of a score of books and a lecturer who has appeared in



Huge impregnating vats employed in the production of paper condensers, one of the many contributions of the chemical laboratory in condenser manufacture. At the right is C. G. Smith, inventor of the Raytheon gaseous rectifier and an outstanding authority in the field of gaseous conduction and rectification. He has specialized in gaseous phenomena for many years

in saggers and fired in a gas-heated furnace. After firing the parts are rock-hard, with remarkable mechanical, thermal, electrical and chemical properties.

Imagine an insulator which can be heated to incandescence, plunged into cold oil or water, again heated and plunged, over and over again many dozen times, without developing cracks or breaks. That is one of the achievements of the chemists working on these radio insulating materials. Imagine, if you will, a minute tube, about the size of an automatic pencil lead, containing two tiny parallel holes,  $1\frac{1}{2}$  thousands of an inch in diameter! That is what these chemists have produced for the heater type vacuum tube.

Special forms of glass have been developed, with remarkable insulating properties particularly at the higher frequencies. Pyrex has found many important applications in radio. Many of the short-wave antennas used in transoceanic radio work are Pyrex-insulated.

The extremely high frequencies used in very short-wave radio have caused no end of research into better insulating materials. Certain compounds of mica and binders have been developed, such as Micalax, which have proved excellent for the purpose.

There are still endless insulation problems in radio. Aside from those already mentioned, many skilled chemists are engaged in developing suitable enamel insulation for wire ranging from No. 14, which is fairly heavy, down to wire half the diameter of human hair. There are many problems involved in good enamel insulation, not only electrical strength but also ready application; flexibility, so as not to crack when bent, and so on.

### Impregnating Compounds

Closely allied to insulating problems are the impregnating compounds. These serve to insulate, but must possess additional features such as sufficiently low melting point, so as not to heat the embedded components unduly; freedom from chemical action with the imbedded components; sufficient mechanical strength, permanency and so on.

The story is told in the radio industry how a certain form of superheterodyne assembly, representing the very heart of a remarkable radio receiver, had to be virtually embalmed in impregnating compound as protection against position displacement, moisture and so on. The task seemed simple enough to manufacturers accustomed to impregnating electrical windings. Hence the same treatment was given to the superheterodyne assembly, known as the "catacomb" because of the maze of wires. However, for some unknown reason, the catacombs did not stand up. They "went bad" in short order.

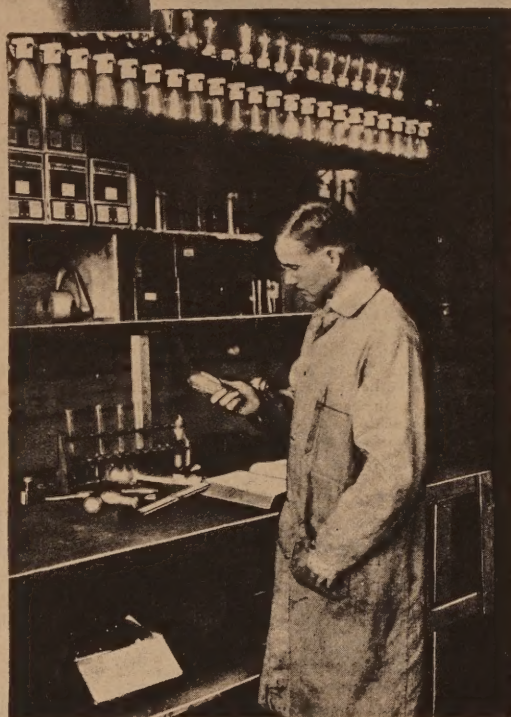
practically all English-speaking parts of the world, Thomas was widely known as a reporter and traveler before he entered radio in 1930. He was born in a Colorado mining town and while still in his early twenties led two expeditions into the Arctic. Since then his explorations have included extensive tours into Malaya, Upper Burma and Central Asia. Thomas was the man who gave the world its first account of Colonel T. E. Lawrence, the mystery man of Arabia. He was one of the first correspondents to enter Germany after the signing of the armistice. On the new sponsored program series, Thomas comments on news events in much the same manner as on his old Literary Digest series.

## Did YOU Ever Stop to Think?

That the chemist has had almost as much to do with perfection of the radio as has the electrical and radio engineer?

That every single new development requires some contribution from the chemical laboratory?

That without the chemist's contribution of improved materials the vacuum tube would be little beyond the state of development it had attained in 1910?



A chemist was set to work, and he soon discovered certain chemical action between the compound and certain metal parts imbedded therein. Because the impregnating compound was ideal in every other respect, the chemist worked out the solution in the form of a certain lacquer protective coating for the metal parts causing the trouble. The catacombs thereafter were entirely satisfactory.

Much audio transformer trouble has been traced to impregnating compounds. The wire in the secondary winding of the usual audio transformer is exceedingly fine and it does not take much corrosion to destroy the winding. Hence the chemist has been enlisted in this work, so as to provide transformers that really last.

### A Study in Rare Alloys

Much of the present-day radio work falls in the class of metallurgy, which is perhaps just (Continued on page 73)

next door to strictly chemistry. In the development of audio transformers, it has been necessary to develop alloys of desirable magnetic characteristics. From common grades of iron, in laminated form, radio manufacturers have gone to silicon iron, nickel iron, and other alloys, some of them quite costly, in quest of desirable characteristics so as to provide true tone response over the entire musical frequency scale. Certain patent considerations, particularly covering nickel steel, have caused some transformer manufacturers to search and search for suitable alloys that might circumvent the patents. A remarkable opportunity has been offered to the metallurgist in this field.

Even in the familiar dynamic loud speaker, metallurgy plays an important part. The grade of iron used for the core of the electromagnet is most important, for it determines just how much magnetic flux shall be obtained from a given bulk of iron, and this bulk, in turn, determines just how efficient the loud speaker shall be. The less the bulk for a given flux density, the better the loud speaker.

### The Chemist and Vacuum Tubes

Consider the vacuum tube. To the layman, it is simply a piece of wire called the filament, which is heated by means of current; a lattice member, called the grid, which handles the control energy; a cylinder, called the plate, which handles the output energy; and a glass envelope to provide a means of placing these elements in a good vacuum. Simple enough. Yet there is a world of chemistry involved in the vacuum tube—a sad truth which vacuum tube manufacturers have learned.

First of all, there is the filament. The trend today is decidedly towards the oxide-coated filament, and away from the tungsten and thoriated tungsten types, thereby multiplying the chemical problems just about a thousand times. Special alloys are being sought for the wire, and, in many instances, found by chemists specializing in vacuum tube problems. Nickel, heretofore used mainly for filament, is being abandoned, because of its chemical interaction with the carbonates used as the coating. In fact, it was a chemist who first told vacuum tube manufacturers why certain low-current types "went west" after a few hours of use.

Oxide-coated filaments require many things. First, there must be the wire, chemically immune to the carbonates even at high temperature. The wire must offer the necessary high electrical resistance, so as to be economical in operation. The best wires are those with a cold resistance several times that of nickel, and with the resistance rising rapidly as they warm up, so as to provide some measure of automatic current regulation. The wire must not stretch unduly when heated, to sag and "short" with the near-by grid. A high melting point is necessary, for the carbonates require about 750 deg. C. to provide the necessary emission.

And then there is the oxide coating, usually made up of strontium and barium carbonates, prepared with utmost care and then applied to the wire by means of successive dippings and bakings in a continuous operation, and by means of an air brush in the case of the a.c. heater cathodes. Utmost precautions are taken to guard against impurities in the oxide coating. The larger vacuum tube manufacturers maintain chemical laboratories just for wire and cathode coating, in charge of trained chemists.

The greatest obstacle encountered in the production of good vacuum tubes is gas. Utmost precautions must be taken to be sure that all the gas is removed from the tube before sealing. To this end the pumping is carried out as far as possible within the economic time limit, followed by the flashing of a chemical or "getter" to clean up the remaining gases. The metal parts are frequently baked in a hydrogen atmosphere, so as to remove oxygen in the pores of the metal. Even so, with nickel for the support wires, plate and grid, there is considerable imbedded gas which is certain to be exuded when the tube is in use, resulting in gassy tubes. For this reason, molybdenum or "molly" plates are frequently used, also molybde-

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Factory to you. Save to 50% on latest Screen Grid Electric or Battery Radio. Get 'Send No Money' Offer.

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**Midwest Radio Corporation**

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504-DJ, Miraco Dept., Cincinnati, Ohio

**SUPER Screen Grid \$49.98**

All styles of latest cabinets. Complete less tubes.

**The ROOSEVELT**

Super-Heterodyne

Uses new Pentode power tubes in push-pull, also new type variable-mu screen grid, 9 tubes in all, 10 KC. separation, wonderful tone and distance. The most perfect radio ever built.

**New CUB Midget**

Uses new Pentode power tube and variable-mu screen grid. Fine tone, selectivity and distance. Complete with tubes, \$49.75.

**COMMONWEALTH RADIO MFG. CO.**

837 W. Harrison St., Cable: RADCOM, CHICAGO

Both ads: July 1931

Radio News for August, 1925

1925 ad

1977 ad

**Music Master**Resonant Wood Insures  
Natural Tone Quality

## —evolution

A series of receivers designed to provide powers of radio reception equal to the capacities of Music Master Reproducer.

*The Musical Instrument of Radio  
—there IS no substitute*

## Type 215

Six-Tube Special Music Master Circuit. Built-in Music Master Reproducer. Very selective, long range, and splendid tone quality. Solid mahogany cabinet in brown mahogany art satin finish.

Price \$215

MODEL VI \$30  
14" Wood Bell - - - -  
MODEL VII \$35  
21" Wood Bell - - - -

(Prices of all models slightly  
higher in Canada)

Canadian  
Prices  
Slightly  
Higher

Six Models  
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Guaranteed  
Unconditionally

**AT LAST**—radio reception incorporating the demonstrated results of latest radio research, and combining in one superb radio ensemble the proved principles of Music Master Radio Reproduction.

Audition will prove MUSIC MASTER'S outstanding powers of long range and high selectivity, its clarity and volume, and above all, its supreme Tone Quality based on MUSIC MASTER Reproducer as a vital element of the ensemble.

Sold by authorized distributors and by Registered Dealers everywhere.  
Call on your MUSIC MASTER dealer—today. See MUSIC MASTER  
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**Music Master Corporation**

Makers and Distributors of High-Grade Radio Apparatus

128-130 N. Tenth Street

Chicago New York PHILADELPHIA Pittsburgh Montreal

Canadian Factory: Kitchener, Ontario

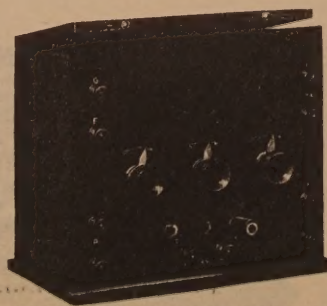
Merchants of standing desirous of profiting by Music Master prestige and reputation are invited to communicate with Music Master Corporation

**Music Master**  
RADIO PRODUCTS

Part of 1921 ad

1921 ad

**NEW ORLEANS**  
**RADIO**  
APPARATUS  
and SUPPLIES  
ROSE RADIO SUPPLY  
604 Gravier St., New Orleans, La.  
Send 10c for Latest Catalog

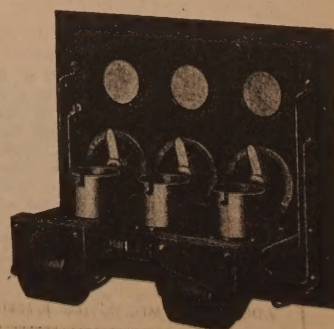


**G. M. PROUDFOOT**  
DETECTOR AND TWO-STEP  
AMPLIFIER

Highest Quality Lowest Prices

Detector and One-Stage Amplifier  
\$25.00

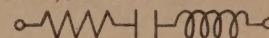
is duplicate of above only one unit less.

**Now Available!**

FROM  
TIN FOIL  
TO  
STEREO

Here's your second edition of the 1877-1959 phono classic, now extended to 1976.

Discover the story of recorded music in 30 fascinating chapters. Enjoy photos of exotic music machines from early cylinder phonographs to stereo. Own THE reference for phonograph enthusiasts. \$19.95 hardcover, \$9.95 soft.



**SILVER GHOSTS:** 76 beautiful pages of Scott radios, from the earliest 1940's. Puett's classic with pictures, old ads and diagrams. \$10.00.

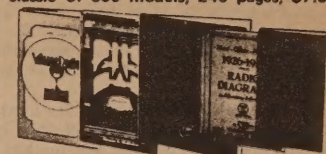
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**CIRCUIT DIAGRAMS** for any pre-1951 radio, just \$3.50. Send model number.

**SEND TODAY** to Vintage Radio, Dep't D, Box 2045, Palos Verdes, Ca. 90274. We pay postage. Calif. residents add 6%.

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FREE! Age Guide with each order. FREE!

**You'll Enjoy It!**

| SYMBOLS ADAPTED BY I.R.E. | OTHER SYMBOLS | NAME                                       |
|---------------------------|---------------|--------------------------------------------|
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|                           |               | INDUCTION COUPLING OR AIR CORE TRANSFORMER |
|                           |               | AUTO-TRANSFORMER                           |
|                           |               | IRON CORE TRANSFORMER                      |
|                           |               | AMMETER                                    |
|                           |               | VOLTMETER                                  |
|                           |               | WIRES CROSSED JOINED                       |
|                           |               | WIRES CROSSED NOT JOINED                   |
|                           |               | ANTENNA                                    |
|                           |               | GROUND                                     |
|                           |               | TELEPHONE RECEIVER                         |
|                           |               | COIL OR LOOP ANTENNA                       |
|                           |               | LOUD SPEAKING TELEPHONE RECEIVER           |
|                           |               | THREE ELECTRODE VACUUM TUBE                |



M. LÉON DELOY, OF NICE, FRANCE

Who was the first French amateur radio telegrapher to attain two way communication with American amateurs.

Occurrence: last months of 1923 Source: Radio Broadcast, 1924, p. 423.

| SYMBOLS ADAPTED BY I.R.E. | OTHER SYMBOLS | NAME                                              |
|---------------------------|---------------|---------------------------------------------------|
|                           |               | BATTERY                                           |
|                           |               | SINGLE CELL                                       |
|                           |               | DIRECT CURRENT GENERATOR                          |
|                           |               | ALTERNATING CURRENT GENERATOR                     |
|                           |               | RESISTANCE (NON INDUCTIVE)                        |
|                           |               | VARIABLE RESISTANCE OR RHEOSTAT                   |
|                           |               | CONDENSER FOR AUDIO FREQUENCIES                   |
|                           |               | CONDENSER FOR RADIO FREQUENCIES                   |
|                           |               | VARIABLE CONDENSER (THE DOT IS ON ROTATING PLATE) |
|                           |               | INDUCTANCE                                        |
|                           |               | IRON CORED INDUCTANCE                             |
|                           |               | VARIABLE INDUCTANCE OR VARIOMETER                 |
|                           |               | INDUCTANCE VARIABLE BY TAPS                       |
|                           |               | CRYSTAL DETECTOR                                  |

1923

COMMON SYMBOLS USED IN RADIO CIRCUITS

**WOOD'S**  
**The Thing!!**

MUSIC MASTER is equipped with a wood amplifying bell. Wood, properly shaped as a horn,—furnished only with MUSIC MASTER,—is the one material that makes possible perfect reproduction of the actual, living tones themselves.

Go to your radio dealer and ask to hear MUSIC MASTER. Its clarity, brilliance and naturalness of tone will delight you—and prove to you that MUSIC MASTER is more than a name.

14" Model for the Home, \$30  
21" Model for Concerts, \$35

Comes complete, ready to attach in place of headphones. No adjustments. No batteries required

DEALERS EVERYWHERE

**WARREN RADIO LOOP**

**Try This Perfected Loop AT OUR EXPENSE**

Selective, directional. Reduces reradiation and interference. Extremely compact. Entirely enclosed by Bakelite shields. Send a postal, specifying the type you want to try. The money you pay the postman may be refunded any time during the 10 days you try it out. Keep it only if it satisfies. Write the postal NOW!!

Type-A-737 (300-700 meters) 6 inches square—non-directional.....\$10.  
Type-A-738 (700-1000 meters) 6 inches square—non-directional.....\$12.  
Type-B-2537 (300-700 meters) 18 inches square—directional.....\$20.  
Type-BL-2520 (200-15,000 meters) with honeycomb coil mounting, 18 inches square—directional.....\$25.

SEND FOR BULLETIN X-102

V-DE-CA RADIO MFG. CO., Dept. B, ASBURY PARK, N. J.

1924 ad

1924 ad

**MUSIC MASTER CORPORATION**  
(Formerly General Radio Corporation)  
Makers and Distributors of High-Grade Radio Apparatus

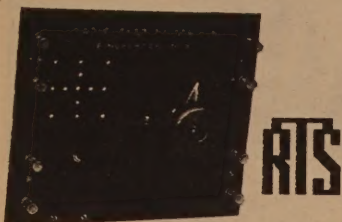
CHICAGO S.W. Cor. 10th and Cherry Sts., PHILADELPHIA PITTSBURGH

**Music Master**  
RADIO REPRODUCER

1921 ad

1921 ad

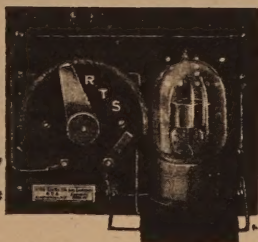
## Wonderfully Perfected RTS STANDARD Detector Panel



Price  
\$5.95

without  
tube

Prepaid by  
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Install this efficient R.T.S. Panel and you possess a correctly designed Detector Panel capable of producing signal strength unequalled by any other tested in our laboratory. It is guaranteed.

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### RADIO TESTING STATION

Dept. 4, 25 Sturges St.

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## use A-P tubes for efficiency

### NOTE NEW LOW PRICES

A-P Tubes are licensed by the Radio Corporation of America under the DeForest Audion and Fleming patents for amateur and experimental use in Radio communication.

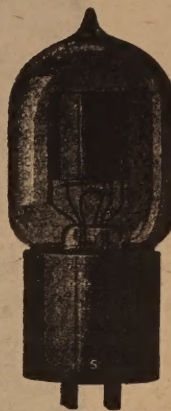
In addition to being national distributors for the Moorhead Laboratories, Inc. Mfrs. of A-P Tubes, the Atlantic Pacific Radio Supply Company are also exclusive Pacific Coast distributors for the following companies and products:—Shaw Insulator Co., Mfrs. of moulded equipment, DeForest Radio Tel. & Tel. Co., Mfrs. of radio equipment, Diamond State Fibre Co., Mfrs. of Condensate-Coloron, Rodmanol Chemical Products Co., Mfrs. of insulating varnishes and lacquers.



THE A-P VT  
AMPLIFIER-  
OSCILLATOR

—the amplifier used by the U. S. Navy.  
"Use the tube the Navy uses."

Price \$6.50



THE A-P  
ELECTRON  
RELAY

—the most sensitive detector of spark signals known to the radio-art.

Price \$5.00

AT YOUR DEALER OR DIRECT FROM

### ATLANTIC PACIFIC RADIO SUPPLIES CO.

HENRY M. SHAW, President

638 Mission St., San Francisco, California

## PAUL F. GODLEY

selects A-P Tubes for  
supreme English test.

He wires:—"A-P Tubes selected as most satisfactory on American market for use in multistage amplifiers because of their low capacity and low current consumption."

The A. R. R. L. is sending Paul F. Godley, of Montclair, New Jersey, to England to receive messages from American amateurs. Because the efficiency of multistage radio frequency and audio frequency amplification depends entirely upon the tubes used in his multistage amplifiers, he has chosen A-P Tubes exclusively for this purpose. The A-P Amplifier Tube is the tube used by the United States Navy, the famous Navy Type S.E.-1444.

"Use the tube Paul F. Godley has selected." "Use the tube the A. R. R. L. will use in the supreme test." "Use the tube the Navy uses." "Use A-P Tubes for efficiency."

At your dealer or direct from the factory. Note the new low prices and order now.

COLUMBIA  
STERLING



1906

Disc Graphophones

Type BI  
\$45.00

COLUMBIA  
MAJESTIC



Disc Graphophones

Type BD  
\$100.00

### INSTRUCTION CARD IC-86968

### INSTRUCTIONS FOR INSTALLING AND OPERATING AG-814 RADIOLA LOOP ANTENNA

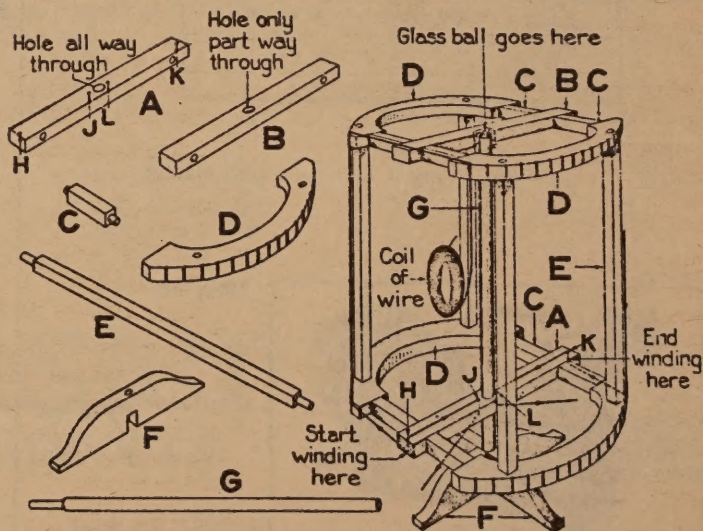


Fig. 1

Fig. 2

The loop is made with the following parts:

- |                                |                 |
|--------------------------------|-----------------|
| 1 center piece A               | 4 long dowels E |
| 1 center piece B               | 2 base pieces F |
| 8 short dowels C               | 1 shaft G       |
| 4 semi-circles D               | 1 glass ball    |
| 1 coil of wire (113 feet long) |                 |

For Sale; RCA AG-814 Loop repro. Kit incl; Woven brown braid covered wire, Etched brass name plate, 1924 Inst. card, Mahogany frame. \$50. FOB USA. Satisfaction or refund. Antenna wire avail. \$1.00 for card & wire sample. Glenn Streeter, 26008 Crenshaw Blvd. #106D, Torrance, California, 90505 (213)541-3279.

1977 ad

Classified ad rate: 6¢ per word.

Photo ads: \$2.00 extra.

Deadline: 20th of the preceding month.

## MISC.

"RADIO AGE" a radio magazine devoted to wireless and early broadcast eras. Contains interesting articles written by collectors, articles published in early radio magazines, lots of reprints of famous radio ads, and a classified section for buying or selling radio and electronic items. Subscribe at \$7.50 per year for ten issues.

Mail check or money order to Radio Age, 1220 Meigs Street, Augusta, Georgia 30904.

## FOR SALE OR TRADE

FOR SALE: 1918 Duck Catalog (#11), professional reprint, 240 pages with hundreds of illustrations. A gold mine of information on pre-1920 wireless equipment. Each article for sale is thoroughly explained by the catalog. Many bread board loose coupler receiver/spark gap transmitters shown with schematics and parts lists. Excellent quality, satisfaction guaranteed, \$7.00 post paid (book rate). Dick & Ann Schamberger, 1975 Hertel Ave., Buffalo N.Y. 14214. Also available: Operators manuals and catalogs for Federal telephone and telegraph receivers, SASE for details.

FOR SALE: 3 AK Breadboards, excellent \$300. each. Kennedy XV \$225. Marconi Model 55 Portable \$55. Grebe CR-12 \$325. Send SASE for list. Paul Giganti, 2429 San Carlos Ave., San Carlos CA 94070. Phone: 415 593-4723.

BLANK BAKELITE PANELS - Cut to size, 1/16" to 3/8" thick. Fabricating and engraving services available. SASE for pricing sheet. Parsons, WB1BVO, 22 Forest St., Branford CT 06405.

WD11 Adaptors, use UX199, 120, VT24. No wiring changes, Radiola III's battery hook-up included \$5.25 pp., 2 for \$9.25 Keith Parry, 17557 Horace St., Granada Hills CA 91344.

WD11A--\$10.--uses old style 864.

WD11B--\$10.--uses new style 864 (now-microphonic)

WD11R--\$10.--uses low filament current tube.

ABOVE three tubes are mounted on new style WD11 Base.

X99R or X20R \$5. V99R or V20R \$7.

RADIOLA BATTERY SET SERVICE

MANUAL 1922-27--\$5.....35 pages, covers ten Radiolas not covered in Riders.

A FREE copy to the first one who sends a post card offering to send a "Riders Vol. 16 to 23 index," to be copied and returned.

Needed Riders Radio Vols. 20, 21, 23. Will pay \$10. each or trade any of above items, or Riders TV

## FOR SALE OR TRADE

one to twelve or Riders Radio 3, 4, 8, 10, 11, 13, 14, 15.

Ken Hanson, 3403 E. Broadway, Long Beach CA 90803.

FOR SALE: Have quantity of Victor, Columbia, Cheney, Sonora, Edison and others in both table and upright model Victrolas. All in excellent working order. Also have restored early 1930's Radios in both Cathedral and Console models. Some battery radios. Send SASE for list. Will do restoration work for anyone desiring same. Philip Guinan, Route 1, Page Road, Hudson N.H. 03051. Phone: 603 883-8586.

WE ARE COMPILING a catalogue of early day radio test equipment. Pictures, catalogues and literature of this early day radio test equipment is needed. Give particulars and price in first correspondence. Wm. L. Poston, 3212 Peach Tree Ct., Bakersfield CA 93301.

FOR SALE: A. K. 165 Cath., works good, needs refinishing \$85.

U. S. Gloritone 99A Cath. touchy volume \$65.

Splitdorf R-500 with matching horn, not checked, no tubes \$85. 10% shipping.

WANTED: WD11 tubes. Ross Mason, 641 So. Georgia, Mason City, Iowa 50401. Phone 515 423-4687.

FOR SALE: Zenith 3R receiver, #565, 4 tube, with a Music Master Radio Reproducer horn speaker. Tubes and battery clamps. Tom Flanders, 4125 W. 127th Street, Apt. 7-W, Alsip, Illinois 60658.

FOR SALE: Crosley Trirdyn \$38; Metrodyne \$23; Radiola 100 speaker \$12; Rola speaker \$20; plus shipping. Also earphones, tubes. SASE to Arthur Harrison, 1021 Falcon Drive, Columbia MO 65201.

SELLING battery radios, speakers, paper, early test equipment, record collection, other. Large SASE for lists; state categories of interest. R. W. Claude, 54 Dublin Ave., Nashua NH 03060 or 1-603 889-4254 on Tuesdays 9 p.m. to 11 p.m. EST.

FOR SALE OR TRADE: Large list of early radios and equipment available for large SASE with 24¢ postage. Glenn Streeter, 26008 Crenshaw Blvd., #106D, Torrance California 90505.

FOR SALE: Send large SASE plus 26 cents postage for latest list of radios, tubes and literature. Richard Wolven, 2614 Reno Road, Castleton N.Y. 12033.

FOR SALE: Early model RCA portable mixer; aluminum case, \$20.00. C. D. Houston, Jr., 3960 Three Mile Drive, Detroit, Michigan 48224. 313 TU2-1836.

FOR SALE: Victrola Credenza #2508 spring drive. Good-excellent, too heavy to ship \$150.00. H. Balmer, 610N 14, Marysville KS 66508.

## FOR SALE OR TRADE

XEROX AWA OTB'S, same format, stapled, 7-1 through 9-4, \$12. One group Xerox Modern Electrics, 12 issues 1910-12, 300 9x14 pages, \$20. (under my cost). Original Modern Electrics 9/12, waterstained, \$10. Postpaid. Alan Douglas, Box 225, Pocasset MA 02559.

FOR SALE OR TRADE: Westinghouse RA-DA, Pilot TV, Freshman Masterpiece with built in horn, David Grimes 6 tube in fancy cabinet, Trinity 2-T-6 in fancy cabinet, and more. SASE. Richard Cane, 8391 NW 21st. St., Sunrise FL 33322.

EDISON COLUMBIA cylinder records. Always in stock! New showroom with museum. Phonograph repairs our specialty. Send us your want list with SASE, Olden Year Musical Museum, Dept. #6, 2708 Jubilee Trail, Arlington TX 76014.

FOR SALE: Early battery and AC radios, speakers, phones, parts, miscellaneous, new speaker cords \$2.00 each. Large SASE for lists.

WANTED: Base with driver for AK "L" horn, RCA III A panel. Franklin Haas, 207 West 30th., Hutchinson, Kansas 67501.

HAVE SCARCE OLD RADIO - TV tubes. Also some old radios. SASE for prices. Harold's Radio, 3106 N. 3rd., Harrisburg PA 17110.

## WANTED

WANTED TO BUY: Test equipment from the 20s and 30s mint condition preferable. Give complete discription, condition and price prepaid and insured in first correspondence. Picture will be helpful. Wm. L. Poston, 3212 Peach Tree Ct., Bakersfield CA 93302.

WANTED: Any radio fan magazines. Also, any radio magazine with commercial broadcast or star information. Examples--"Radio Guide, Radio Stars, Radio-TV Mirror,"etc. Also "Photoplay" magazines. 1 or a 100. Fred L. Davis, 5106 Skippy Street, Memphis, Tennessee 38116.

WANTED: Scott, McMurdo Silver, Lincoln, and other classic receivers. Also pre-1930 battery sets, speakers, mikes, etc. J. E. Cunningham, 23W 675 Ardmore, Roselle IL 60172.

WANTED: Pre-1940 TVs also will pay \$100. for restorable Pilot TV-37. Bill Russell, 6463½ Fulton, Van Nuys CA 91401.

WANTED: Kellogg tubes, radios using Kellogg tubes, anything! Also, Breadboard variometer vernier dial plates. Rosenthal, 507 S. Maryland Ave., Wilmington, Delaware 19804.

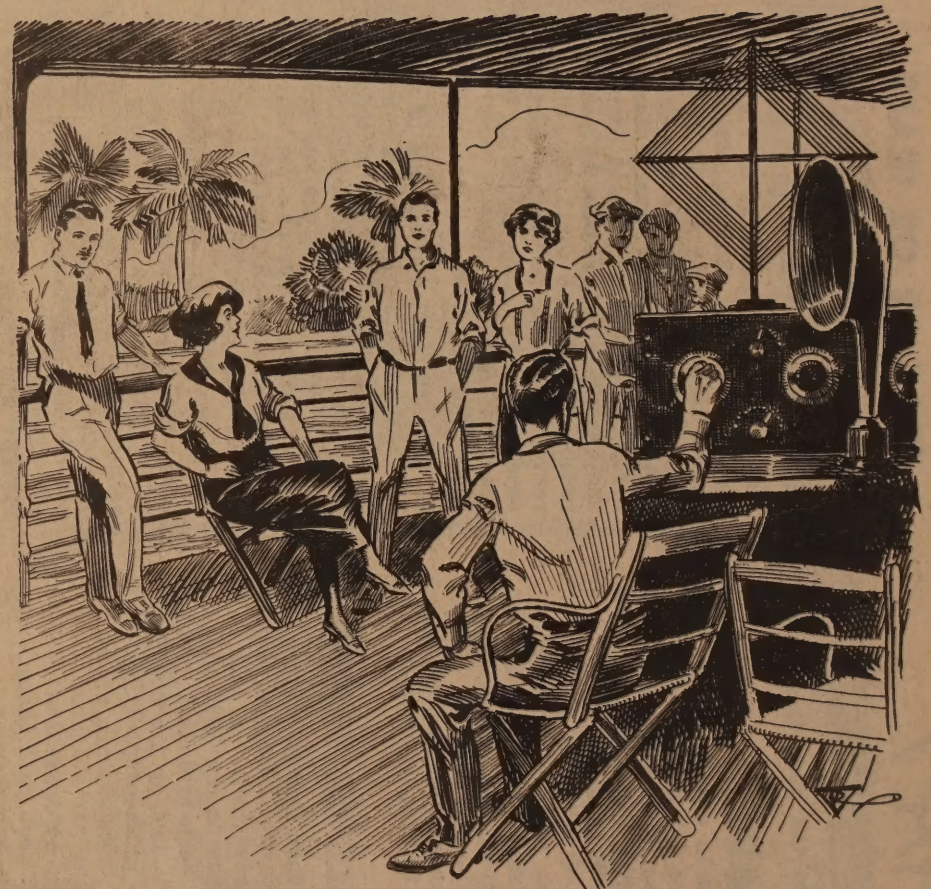
WANTED: Adams-Morgan RA-6 receiver. Cash or trade. Hoffman, 2570 Falcon Street, E. Meadow N.Y. 11554.

JUNE

75c

# THE HORN SPEAKER

1977



Mr. Art B. Corbus  
1501 Greenwood Ave. N. #105  
Seattle, Wash. 98103

7

PUETT ELECTRONICS PUETT ELECTRONICS PUETT ELECTRONICS PUETT ELECTRONICS PUETT ELECTRONICS



## PUETT ELECTRONICS

P.O. BOX 28572 DALLAS TEXAS 75228

PUBLISHERS OF  
THE CLASSIC RADIO NEWSLETTER

LIST NO. 16A

(send 13¢ stamp for newsletter sample)

### HOW TO ORDER

- (1) Make checks and money orders payable to PUETT ELECTRONICS.
- (2) WE SHIP PARCEL POST. NO C.O.D. INCLUDE 15% FOR POSTAGE & HANDLING. POSTAL INSURANCE RATES ARE 60¢ FOR ORDERS UP TO FIFTY DOLLARS. MINIMUM ORDER \$3.00 - DOES NOT APPLY TO SCHEMATIC DIAGRAMS OR BOOKLETS. ORDERS WHICH EXCEED \$50.00 ARE SHIPPED POSTPAID. TEXAS RESIDENTS ADD 5% STATE SALES TAX.

### POLICY

**CUSTOMER SATISFACTION GUARANTEED** If you are not satisfied with your order for any reason, tubes may be returned within ten days for refund or replacement with exception of tubes which are shorted or have open filaments. It will be assumed that returned tubes with open filaments or shorts were damaged in shipment. Shipping damage claims will be handled promptly through the post office on insured orders. PUETT ELECTRONICS assumes no liability for orders which are not insured, and no liability beyond that which is covered by postal insurance. The tubes listed herein are either new, military pull-outs, factory over-purchases, or used. If only new tubes in original cartons are acceptable, add 10% to the total cost of your tube order. REFUNDS are mailed with your invoice for out-of-stock merchandise. ALL TUBES ARE THOROUGHLY TESTED ON A MUTUAL CONDUCTANCE TUBE CHECKER BEFORE SHIPMENT. ALL TUBES MUST MEET NEW TUBE STANDARDS WHEN CHECKED. All prices are subject to change without notice. All tube prices listed herein supersede prices in previous lists and ads. We offer free technical advice for a 13¢ stamp or you may call J. W. F. Puett at 214-279-8309 NO LATER THAN 10:00 PM CENTRAL STANDARD TIME - PLEASE.

### ANTIQUE RADIO TUBES

PUETT ELECTRONICS HAS HUNDREDS OF OTHER TUBE TYPES NOT LISTED HEREIN. FOR OTHER TUBE TYPES, SEND 65¢ FOR CATALOG.

|          |          |           |           |           |           |
|----------|----------|-----------|-----------|-----------|-----------|
| 6R7 \$4  | 7B5 \$3  | 12K7 \$4  | 25AC5 \$3 | 50C6 \$4  | 117N7 \$7 |
| 6B6 \$4  | 7B6 \$4  | 12K8 \$4  | 25B6 \$3  | 50L6 \$3  | 117P7 \$7 |
| 7B7 \$4  | 12L6 \$2 | 25C6 \$2  | 50X6 \$4  | 117Z3 \$3 |           |
| 7B8 \$4  | 12Q7 \$4 | 25L6 \$3  | 50Y7 \$4  | 117Z4 \$4 |           |
| 7C5 \$3  | 12S8 \$3 | 25S \$4   | 51 \$4    | 117Z6 \$4 |           |
| 65A \$4  | 7C6 \$4  | 12S7 \$3  | 25Z5 \$3  | 55 \$5    | 485 \$5   |
| 65B \$4  | 7C7 \$4  | 12S7 \$3  | 25Z6 \$3  | 56 \$3    | 884 \$7   |
| 65A7 \$3 | 7E6 \$4  | 12SF5 \$3 | 26 \$6    | 57 \$4    | 950 \$5   |
| 65B7 \$3 | 7E7 \$4  | 12SF7 \$3 | 26A6 \$4  | 58 \$4    | 951 \$5   |
| 65C7 \$3 | 7F8 \$5  | 12SG7 \$3 | 26A7 \$4  | 59 \$6    | 955 \$4   |
| 65D7 \$3 | 7G7 \$4  | 12SH7 \$3 | 27 \$4    | 70A7 \$3  | 958 \$4   |
| 65F5 \$3 | 7H7 \$4  | 12SJ7 \$3 | 28D7 \$3  | 70L7 \$5  | 1201 \$4  |
| 65F7 \$3 | 7J7 \$4  | 12SK7 \$3 | 30 \$5    | 71A \$7   | 1203 \$4  |
| 6C6 \$4  | 69C7 \$4 | 12TL \$4  | 31 \$4    | 75 \$4    | 1232 \$4  |
| 6C7 \$4  | 69H7 \$3 | 7Q7 \$4   | 12SN7 \$3 | 32 \$4    | 76 \$3    |
| 6C8 \$4  | 69J7 \$3 | 7R7 \$4   | 12SQ7 \$3 | 33 \$4    | 77 \$4    |
| 523 \$3  | 6D6 \$4  | 6K7 \$3   | 7S7 \$4   | 12SR7 \$3 | 34 \$4    |
| 524 \$3  | 6D7 \$4  | 6L7 \$3   | 7V7 \$4   | 12V6 \$3  | 35 \$4    |
| 54A \$3  | 6A3 \$3  | 6A4 \$6   | 6E5 \$5   | 65O7 \$3  | 7X6 \$4   |
| 54B \$3  | 6A5 \$4  | 6E6 \$4   | 6SR7 \$3  | 7X7 \$4   | 1223 \$2  |
| 1T5 \$3  | 104 \$4  | 105 \$3   | 1V \$5    | 6A6 \$4   | 6E7 \$4   |
| 104 \$4  | 105 \$3  | 1V \$5    | 6A6 \$4   | 6E7 \$4   | 6A8 \$4   |
| 1A1 \$5  | 1H4 \$5  | 2A4 \$5   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1A3 \$4  | 1H6 \$4  | 2A5 \$4   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1A4 \$4  | 1L6 \$4  | 2A6 \$4   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1A5 \$4  | 1L6 \$4  | 2A7 \$5   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1A6 \$3  | 1LA4 \$4 | 2B7 \$4   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1A7 \$3  | 1LA6 \$4 | 2B7 \$4   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1B4 \$4  | 1LB4 \$4 | 2X2 \$5   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1B5 \$4  | 1LC5 \$5 | 3A4 \$5   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1B7 \$4  | 1LC6 \$4 | 3A5 \$5   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1B8 \$4  | 1LD5 \$4 | 3A8 \$4   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1C1 \$4  | 1LE3 \$4 | 3C6 \$4   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1C5 \$3  | 1LF3 \$4 | 3LF4 \$5  | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1C6 \$3  | 1LG5 \$4 | 3Q5 \$3   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1C7 \$5  | 1LH4 \$4 | 3V4 \$3   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1D5 \$5  | 1LN5 \$4 | 5A2 \$4   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1D7 \$5  | 1N5 \$4  | 5R4 \$2   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1E5 \$5  | 1N6 \$4  | 5T4 \$2   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1E7 \$4  | 1P5 \$4  | 5U4 \$2   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1F4 \$4  | 1Q5 \$4  | 5V4 \$2   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1F5 \$4  | 1R5 \$2  | 5W4 \$2   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1F6 \$4  | 1S5 \$2  | 5X4 \$2   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |
| 1F7 \$5  | 1T4 \$3  | 5Y3 \$3   | 6A8 \$4   | 6E7 \$4   | 6A9 \$4   |



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